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10/577,471	04/27/2006	Yuji Iwaki	0756-7673	4788

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EXAMINER	
WILSON, MICHAEL H	

ART UNIT	PAPER NUMBER
1794	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/577,471	IWAKI ET AL.	
	Examiner	Art Unit	
	MICHAEL WILSON	1794	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *23 January 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-9 and 11-26* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-9 and 11-26* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. This Office action is in response to Applicant's amendment filed 23 January, 2009, which cancels claim 10 and amends claims 1-5, 8, 9, 13, and 15-22.

Claims 1-9 and 11-26 are pending.

2. The rejection under 35 U.S.C. 102(b) of claims 1, 3, 4, 6-9, 13, 15, 16, 18-21, 25, and 26 as being anticipated by Sato et al. (US 2003/0218418 A9), is overcome due to Applicant's amending of the claims in the reply filed 23 January, 2009.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

5. Claims 1-3, 5, 6, 8, 9, 11-15, 17, 18, and 20-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sato et al. (US 2003/0218418 A9) in view of Shiratsuchi et al. (US 6,084,176).

Regarding claims 1-3, 5, 6, 8, 9, 11-15, 17, 18, and 20-24, Sato et al. disclose a light-emitting element comprising a first and second electrode [0031], a light-emitting layer between the electrodes [0031], and a layer hole transporting layer [0172]. Additionally the reference discloses the hole transporting layer ensures high efficiency in hole injection from the anode and efficient transportation of hole to the light-emitting layer [0172]. Compounds such as 4,4'-bis[N-(1-naphthyl)-N-phenylamino]biphenyl, aromatic amine compounds having a star burst structure, and spiro compounds such as 2,2',7,7'-tetrakis(diphenylamino)-9,9'-spirobifluorene are disclosed as suitable for the hole transport layer. The reference also discloses metal oxides such as vanadium oxide, ruthenium oxide, and molybdenum oxide as able to facilitate hole injection from the anode with high hole mobility ([0211]-[0212]). A layer of metal oxide on the anode is disclosed to lower initial driving voltage, suppress the voltage elevation on continuous driving, and improve adhesion [0211]. However the reference does not explicitly disclose a carbazole compound with a transition metal oxide in the hole transporting layer.

It would be obvious to one of ordinary skill in the art at the time of the invention to add metal oxides such as vanadium oxide, ruthenium oxide, and molybdenum oxide to the hole transporting layer. One of ordinary skill in the art would reasonably expect such a combination to be suitable given material for the hole transporting layer needs a

small ionization potential, high hole mobility, and excellent stability [0172], which are properties vanadium oxide, ruthenium oxide, and molybdenum oxide are disclosed to have ([0211]-[0212]). Vanadium oxide, ruthenium oxide, and molybdenum oxide are also disclosed to efficiently inject holes from the anode and transport the holes to subsequent layers, which is disclosed as the function of the hole transport layer [0172]. One of ordinary skill in the art would be motivated by a desire to lower initial driving voltage, suppress the voltage elevation on continuous driving, and improve adhesion [0211] without forming additional layers.

Shiratsuchi et al. teach carbazole compounds of instant general formulae (1), (2) with Ar of instant formula 2-1 (compound H-23, column 23), and (3) (compound H-38 column 29) with instant Ar 3-1 (compounds H-24, column 23) and as suitable compounds for the hole transport layer (column 13, line 12 to column 14, line 5) used in a photoelectric device (column 2, lines 12-16). The reference also teaches carbazole compounds a equivalent with hole transporting compounds of Sato et al. such as 4,4'-bis[N-(1-naphthyl)-N-phenylamino]biphenyl, aromatic amine compounds having a star burst structure, and tertiary amine containing fluorene compounds for use in the hole transport layer (column 13, line 12 to column 14, line 5).

In view of Shiratsuchi et al.'s recognition that carbazole compounds and hole transporting compounds of Sato et al. are equivalent and interchangeable, it would have been obvious to one of ordinary skill in the art to substitute the hole transporting compounds of Sato et al. with carbazole compounds such as H-23, H-24, or H-38 taught by Shiratsuchi et al. and thereby arrive at the present invention. Case law holds

that the mere substitution of an equivalent (something equal in value or meaning, as taught by analogous prior art) is not an act of invention; where equivalency is known to the prior art, the substitution of one equivalent for another is not patentable. See In re Ruff 118 USPQ 343 (CCPA 1958).

Regarding claims 25 and 26, Sato et al. disclose all the claim limitations as set forth above. Additionally the reference discloses a means for controlling light emission of the light-emitting element given that the voltage needed to obtain a specific luminance is reported (table 3, page 46). Also the reference discloses an electronic appliance with a display portion comprised of a light emitting element [0261].

6. Claims 1, 4, 7-9, 11-13, 16, 19-21, and 23-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sato et al. (US 2003/0218418 A9) in view of Shirota et al. (US 5,487,953).

Regarding claims 1, 4, 7-9, 11-13, 16, 19-21, and 23-24, Sato et al. disclose a light-emitting element comprising a first and second electrode [0031], a light-emitting layer between the electrodes [0031], and a layer hole transporting layer [0172]. Additionally the reference discloses the hole transporting layer ensures high efficiency in hole injection from the anode and efficient transportation of hole to the light-emitting layer [0172]. Compounds such as 4,4'-bis[N-(1-naphthyl)-N-phenylamino]biphenyl, aromatic amine compounds having a star burst structure, and spiro compounds such as 2,2',7,7'-tetrakis(diphenylamino)-9,9'-spirobifluorene are disclosed as suitable for the hole transport layer. The reference also discloses metal oxides such as vanadium

oxide, ruthenium oxide, and molybdenum oxide as able to facilitate hole injection from the anode with high hole mobility ([0211]-[0212]). A layer of metal oxide on the anode is disclosed to lower initial driving voltage, suppress the voltage elevation on continuous driving, and improve adhesion [0211]. However the reference does not explicitly disclose a carbazole compound with a transition metal oxide in the hole transporting layer.

It would be obvious to one of ordinary skill in the art at the time of the invention to add metal oxides such as vanadium oxide, ruthenium oxide, and molybdenum oxide to the hole transporting layer. One of ordinary skill in the art would reasonably expect such a combination to be suitable given material for the hole transporting layer needs a small ionization potential, high hole mobility, and excellent stability [0172], which are properties vanadium oxide, ruthenium oxide, and molybdenum oxide are disclosed to have ([0211]-[0212]). Vanadium oxide, ruthenium oxide, and molybdenum oxide are also disclosed to efficiently inject holes from the anode and transport the holes to subsequent layers, which is disclosed as the function of the hole transport layer [0172]. One of ordinary skill in the art would be motivated by a desire to lower initial driving voltage, suppress the voltage elevation on continuous driving, and improve adhesion [0211] without forming additional layers.

Shirota et al. teach carbazole compounds of instant general formula (4) as suitable compounds for the hole transport layer (column 4, lines 38-41, compound 3) used in a organic electroluminescent device (abstract). The reference teaches the

compound to have high heat resistance capable enable high luminance with a high efficiency for a long time (column 1, lines 57-60).

It would be obvious to one of ordinary skill in the art at the time of the invention to combine the carbazole compound of Shirota et al. with the device of modified Sato et al. One of ordinary skill in the art would reasonably expect the compound of Shirota et al. to be suitable in the hole transport layer of modified Sato et al. given that the compound is taught as suitable for the hole transport layer of a similar electroluminescent device by Shirota et al. (column 4, lines 38-4). One of ordinary skill in the art would be motivated by a desire to have high heat resistance capable enable high luminance with a high efficiency for a long time (column 1, lines 57-60).

Regarding claims 25 and 26, Sato et al. disclose all the claim limitations as set forth above. Additionally the reference discloses a means for controlling light emission of the light-emitting element given that the voltage needed to obtain a specific luminance is reported (table 3, page 46). Also the reference discloses an electronic appliance with a display portion comprised of a light emitting element [0261].

Response to Arguments

7. Applicant's arguments filed 23 January, 2009 have been fully considered but they are not persuasive.

Applicants argue that Sato et al. (US 2003/0218418 A9) does not recite a composite material comprising an inorganic compound that is an oxide of a transition metal with a carbazole compound and argue that Shiratsuchi et al. (US 6,084,176) does

not cure the deficiencies in Sato et al. Shiratsuchi et al., applicant argues, does not teach or suggest carbazole compounds with a metal oxide in the hole transporting layer.

In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). While each reference individually does not teach all the claim limitations in combination Sato et al. in view of Shiratsuchi et al. teaches all the claim limitations as set forth above.

Applicants also argue that there is no proper or sufficient reason, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify Sato et al. and Shiratsuchi et al. or to combine reference teachings to achieve the claimed invention. However proper and sufficient reason is clearly set forth above. Case law holds that the mere substitution of an equivalent (something equal in value or meaning, as taught by analogous prior art) is not an act of invention; where equivalency is known to the prior art, the substitution of one equivalent for another is not patentable. See In re Ruff 118 USPQ 343 (CCPA 1958). Further, both references teach the compounds in hole transporting/injecting layers. Sato et al. discloses metal oxides such as vanadium oxide, ruthenium oxide, and molybdenum oxide as able to facilitate hole injection from the anode with high hole mobility ([0211]-[0212]) and also discloses the compounds to efficiently inject holes from the anode and transport the holes to subsequent layers, which is disclosed as the function of the hole transport layer

[0172]. A layer of metal oxide on the anode is disclosed to lower initial driving voltage, suppress the voltage elevation on continuous driving, and improve adhesion [0211]. Given this teaching it would be obvious to one of ordinary skill in the art to add metal oxides taught by Sato et al. to the hole transporting layer. One of ordinary skill in the art would be motivated by a desire to lower initial driving voltage, suppress the voltage elevation on continuous driving, and improve adhesion without forming additional layers. Shiratsuchi et al. teach carbazole compounds for a hole transporting and injecting layer and teach carbazole compounds as equivalent with hole transporting compounds of Sato et al. such as 4,4'-bis[N-(1-naphthyl)-N-phenylamino]biphenyl, aromatic amine compounds having a star burst structure, and tertiary amine containing fluorene compounds for use in the hole transport layer (column 13, line 12 to column 14, line 5). As noted above substitution of an equivalent is considered *prima facie* obvious. Additionally case law holds that the selection of a known material based on its suitability for its intended use supports prima facie obviousness. Sinclair & Carroll Co vs. Interchemical Corp., 325 US 327, 65 USPQ 297 (1045). The selection of the carbazole compounds of Shiratsuchi et al. for a hole transporting layer is taught by Shiratsuchi et al. and therefore would merely be selection of a known compound based on its intended use, as taught by the prior art.

Applicants also argue that Shiratsuchi et al. appears to relate to a solar cell and therefore one of ordinary skill in the art would have had a reason to apply the teachings of, a solar cell to an organic electroluminescent device.

However applicants' are reminded that according to MPEP 2141.01 (a), a reference may be relied on as a basis for rejection of an applicants' invention if it is "reasonably pertinent to the particular problem with which the inventor is concerned." A reasonably pertinent reference is further described as one which "even though it maybe in a different field of endeavor, it is one which, because of the matter with which it deals, logically would have commended itself to an inventor's attention in considering his problem." Shiratsuchi et al. is, therefore, a reasonably pertinent reference, because it teaches hole transporting and injecting layers, between a pair of electrodes, which is a function especially pertinent to the invention at hand.

Applicants do not present arguments regarding Sato et al. in view of Shirota et al. (US 5,487,953), this rejection was presented in paragraph 6, page 9 of the Office Action mailed 19 August, 2008 and is maintained as set forth above.

Conclusion

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL.** See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the

shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to MICHAEL WILSON whose telephone number is (571) 270-3882. The examiner can normally be reached on Monday-Thursday, 7:30-5:00PM EST, alternate Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Larry Tarazano can be reached on (571) 272-1515. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

10. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/D. Lawrence Tarazano/ MHW
Supervisory Patent Examiner, Art Unit 1794